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1.	Your reference	JL2660
2.	Patent application number *(The Patent Office will fill in this part)*	0020956.9
		25AUG00 E563712-1 002806 P01/7700 0.00-0020956.9
3.	Full name, address and postcode of the or of each applicant *(underline all surnames)*	STG Aerospace Limited Narborough Norfolk PE32 1TE
	Patents ADP number *(if you know it)*	
	If the applicant is a corporate body, give the country/state of its incorporation	England
4.	Title of the invention	EMERGENCY LIGHTING
5.	Name of your agent *(if you have one)*	Barker Brettell
	"Address for service" in the United Kingdom to which all correspondence should be sent *(including the postcode)*	138 Hagley Road Edgbaston Birmingham B16 9PW
	Patents ADP number *(if you know it)*	7442494002

		Country	Priority application number *(if you know it)*	Date of Filing *(day/month/year)*
6.	If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and *(if you know it)* the or each application number			

		Number of earlier application	Date of filing *(day/month/year)*
7.	If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application		

8.	Is a statement of inventorship and of right to grant of a patent required in support of this request *(Answer 'Yes' if:* *a) any applicant named in part 3 is not an inventor, or* *b) there is an inventor who is not named as an applicant, or* *c) any named applicant is a corporate body.* *See note (d))*	Yes

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Continuation sheets of this form	-
Description	13 x 2
Claim(s)	-
Abstract	-
Drawing(s)	2 x 2

10. If you are also filing any of the following, state how many against each item.

Priority documents	-
Translations of priority documents	-
Statement of inventorship and right to grant of a patent *(Patents Form 7/77)*	-
Request for preliminary examination *(Patents Form 9/77)*	-
Request for substantive examination *(Patents Form 10/77)*	-
Any other documents *(please specify)*	-

11. I/We request the grant of a patent on the basis of this application.

Signature Barker Brettell Date 25 August 2000

Barker Brettell

12. Name and daytime telephone number of person to contact in the United Kingdom: John Lawrence Tel: 0121 456 1364

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EMERGENCY LIGHTING

This invention concerns improvements in or relating to lighting for use in an emergency to assist evacuation of aircraft, ships, trains, coaches or like mass transportation carriers in an emergency, for example in the event of an accident.

The electrical lighting system provided in aircraft for normal use may be inoperable following an accident if the electrical connections to the power source are damaged. For example, the electrical connections may be broken by impact damage to the structure of the aircraft, and/or by fire and/or by water if the aircraft has to make an emergency landing on land or in the sea. For this reason, it is a mandatory requirement to fit aircraft with an emergency lighting system operable independently of the normal lighting system to provide back-up in the event of failure of the latter and to assist evacuation of the aircraft by identifying an escape route for passengers to follow to the nearest exit.

Fire can result in the cabin rapidly filling with smoke blocking any lighting at ceiling level. Accordingly, to help passengers find their way to exits below the smoke level, for example by crawling along the floor, it is usual to provide emergency lighting at floor level.

The emergency lighting systems commonly employed are electrical requiring a power source and wiring connections separate from the power source and wiring connections of the electrical lighting system for normal use. This adds considerably to the installation costs and these electrical lighting systems for emergency use have been susceptible to failure when required resulting from damage to the power source (e.g. storage

batteries) and/or the electrical connections in the same way as the electrical lighting systems for normal use.

Another disadvantage of electrical lighting systems for emergency use is the additional servicing and maintenance which has to be carried out to check the electrical connections and replace any bulbs or other damaged or broken parts.

A further disadvantage of electrical lighting systems for emergency use is that pre-flight checks have to be carried out to ensure they are in good condition. An aircraft is prevented from taking off if the emergency lighting system fails during a pre-flight check and the aircraft is grounded until the emergency lighting system is repaired. Substantial costs can be incurred if an allotted take-off slot has to be vacated not to mention the inconvenience to passengers caused by a delay while the emergency lighting system is repaired.

An emergency lighting system is known from our UK Patent No.2314536 in which photoluminescent material activated by natural and/or artificial light sources is operable to emit visible light in the absence of the light source(s) to indicate an escape route. In this way, the separate power source and wiring connections required for conventional electrical emergency lighting systems can be dispensed with. As a result, installation and maintenance is simplified and reliability is improved as there are no parts susceptible to failure such as storage batteries, wiring, bulbs etc. Consequently, pre-flight checks with the risk of temporary grounding of the aircraft due to failure of the emergency lighting system is eliminated.

Typically, the photoluminescent material is incorporated in a floor mounted track and the surface of the track which is uppermost is susceptible to being scratched, scuffed, worn or otherwise damaged by people treading on the track. This is a particular problem where the track is provided in areas of high use such as an aisle of an aircraft even if the track is mounted at the side of the aisle adjacent to the seats. Thus, the track may be trodden on regularly by passengers moving to and from their seats. As a result, it may be necessary to repair or replace a track which has been damaged in service outside the normal service or maintenance schedule for the aircraft. Substantial costs may be incurred if an aircraft has to be taken out of service while such repairs are effected, especially if a suitable replacement track is not readily available for fitment.

The present invention has been made from a consideration of the foregoing problem and seeks to facilitate repair and/or maintenance of the emergency lighting system disclosed in our afore-mentioned UK patent.

According to a first aspect of the present invention there is provided an emergency lighting system in or for an aircraft, ship, train, coach or similar mass transportation carrier comprising guide means including an elongate track housing a photoluminescent insert capable of emitting visible light to identify an escape route wherein the track can be fitted either way up with the photoluminescent insert arranged to identify the escape route.

By this invention, a track which is damaged in service can be repaired by removing and re-fitting the damaged track the other way up so that the side which was uppermost originally and has been damaged is now lowermost and the side which was lowermost originally is now uppermost. In this way, a repair can be effected simply and easily in situ using the

existing track thereby eliminating delays caused when a suitable spare part is not to hand and has to be obtained specially.

Preferably, the track comprises an elongate casing in which the photoluminescent insert is housed. The photoluminescent insert may be provided with photoluminescent material on one side only with the insert being removable from the casing. In this way, the orientation of the insert can be reversed when the casing is fitted the other way up so that the photoluminescent material is capable of emitting visible light through that side of the casing which is uppermost in both the original and reversed positions of the track. For example, the outer casing may be an extrusion or moulding of plastics material with an elongate longitudinal slot in which the photoluminescent material is received.

Alternatively, the photoluminescent insert may be provided with photoluminescent material on both sides so as to be capable of emitting visible light through that side of the casing which is uppermost without requiring the orientation of the insert to be reversed. In this arrangement, the photoluminescent insert may be incorporated into the outer casing to provide an integrated unitary construction. For example, the photoluminescent insert may be incorporated by moulding or extruding the outer casing onto the insert so that the insert is permanently attached to the casing.

According to another aspect of the present invention there is provided an emergency lighting system in or for an aircraft, ship, train, coach or similar mass transportation carrier comprising an elongate track capable of emitting visible light to indicate an escape route, the track including an insert extending lengthways of the track, the insert being provided with photoluminescent material on each side, and an outer casing of light

transmissive material covering each side of the insert, the casing being capable of mounting either way up to present a selected one of the first and second sides of the insert for the emission of visible light.

Preferably, the track is substantially symmetrical about a plane through the insert parallel to the longitudinal direction. In this way, the track can be fitted either way up without modification to the surrounding structure.

Advantageously, the insert comprises a thin strip of metal coated with photoluminescent material on each side. For example, the insert may comprise a strip of aluminium having a thickness of preferably not more than 2mm, more preferably not more than 1mm and most preferably 0.66mm or less. In a preferred construction, a strip of aluminium foil is employed but it will be understood, however, that other materials may be employed to support the photoluminescent material.

Preferably, the track is formed integrally in one piece with the insert integrated in the casing. For example, the casing may be moulded or co-extruded onto the insert. In this way, the insert may be encapsulated within the casing. As a result, ingress of dirt or moisture is prevented.

According to a still further aspect of the present invention, there is provided a photoluminescent insert for an emergency lighting system in an aircraft, ship, train, coach or similar mass transportation carrier, the insert comprising an elongate support strip provided on each side with photoluminescent material.

Preferably, the support strip is made of aluminium or other suitable metal or alloy coated on each side with photoluminescent material having

suitable after-glow properties, for example zinc sulphide or strontium aluminate.

Advantageously, the insert is embedded in a light transmissive material such as a plastics to protect the photoluminescent material. For example, the plastics may be co-extruded onto the insert which may be in the form of a metal foil coated on both sides with photoluminescent material.

The photoluminescent material of the insert may be overcoated with a UV protective layer to prevent degradation of the photoluminescent material. Additionally, or alternatively, the light transmissive material may provide UV protection for the photoluminescent material of the insert.

The light transmissive material may be adapted to provide any desired characteristics for the intended application, for example fire resistance.

According to yet another aspect of the present invention, there is providing a method of repairing an emergency lighting system in an aircraft, ship, train, coach or similar mass transportation carrier, wherein the emergency lighting system includes an elongate track arranged to emit visible light photoluminescently from a selected one of two sides of the track, the method including the step of reversing the orientation of the track to emit light photoluminescently from the other side.

Preferably, the photoluminescent emission of light is provided by an insert which may be provided on both sides with photoluminescent material so that the track emits visible light in both orientations. Alternatively, the insert is provided with photoluminescent material on one side only and the method further includes removing and re-fitting the

insert the other way up within the track when the orientation of the track is reversed.

The features, benefits and advantages of the invention will be more fully understood by the following description of exemplary embodiments with reference to the accompanying drawings wherein:-

Figure 1 is a schematic view of the interior of the cabin of a passenger aircraft fitted with an emergency lighting system;

Figure 2 is a cross-section of a first embodiment of a track according to the present invention for use in the emergency lighting system of Figure 1; and

Figure 3 is a cross-section of a second embodiment of a track according to the present invention for use in the emergency lighting system of Figure 1.

Referring to the drawings, Figure 1 shows a typical arrangement of the interior of a cabin 1 of a passenger aircraft. Seats 2 are arranged in rows 3 on opposite sides of a central aisle 4.

In this embodiment, five seats are shown in each row 3 arranged in groups of two on one side of the central aisle 4 and in groups of three on the opposite side of the central aisle 4. This is not essential however and it will be understood that the number and arrangement of seats 2 in each row 3 may be varied while providing a central aisle 4 separating groups of seats 2 in each row 3 for access in the direction of the length of the cabin 1.

Exits 5 are provided at the front and rear of the cabin 1 for passengers to get on and off the aircraft both in normal use and in an emergency. Additional exits 5 are provided mid-way along the central aisle 4, usually opening over the wings (not shown) for use in an emergency.

An overhead electrical lighting system (not shown) is installed in the ceiling of the cabin 1 above the seats 2 for illumination of the cabin 1 under normal conditions. In an emergency, for example following a crash landing or aborted take-off, the ceiling lighting system may be inoperable due to impact damage to the structure of the aircraft or by fire or by water. The ceiling lighting system may also be rendered ineffective or obscured by the presence of smoke in the cabin 1 following outbreak of a fire.

To assist evacuation of the aircraft in the event the normal overhead electrical lighting system fails or is blocked by smoke, a floor mounted emergency lighting system 6 is provided. The emergency lighting system 6 emits visible light photoluminescently to identify an escape route at floor level extending along the central aisle 4 between the seats 2 to the exits 5.

In this embodiment, the emergency lighting system 6 comprises two similar tracks 7,8 arranged on opposite sides of the central aisle 4 adjacent to the rows of seats 2. The tracks 7,8 define the boundaries of the central aisle 4 and lead to each of the exits 5. In this way, the risk of passengers leaving the escape route and becoming trapped between the seats 2 when attempting to evacuate the aircraft in an emergency is reduced. Also, by positioning the tracks 7,8 at the sides of the central aisle 4, the tracks 7,8 are not obscured by movement of passengers along the central aisle 4 between the seats 2.

It will be understood, however, that the provision of two tracks 7,8 is not essential and that a single track may be provided extending along the central aisle 4 to the exits 5. Where a single track is provided, this may extend the length of the central aisle 4 on one side only. Alternatively, the track may extend on one side of the aisle 4 at the fore end and on the other side of the aisle 4 at the aft end. Other track arrangements will be apparent to those skilled in the art.

One construction of track 7,8 embodying the present invention is shown in Figure 2 and comprises an integrated monocoque structure in which a photoluminescent insert 9 is encapsulated in an outer casing 10 of light transmissive material.

The insert 9 comprises a thin, flat strip of aluminium foil coated on each side 11,12 with strontium aluminate and, the casing 10 is a substantially rectangular extrusion of polycarbonate with generally flat outer surfaces 13,14 on each side. The length and width of the insert 9 is such that a major part of the outer surface 13,14 of the track 7,8 is illuminated by the photoluminescent material of the insert 9.

In this embodiment, the insert 9 has a thickness of 0.14mm to 0.20mm and a width of 29.0mm to 30.5mm. The casing 10 has a thickness of 4.14mm to 4.50mm and a width of approximately 36.00mm. As will be appreciated, the use of aluminium foil as the substrate for the photoluminescent material produces a track 7,8 which is relatively thin and lightweight. In this way, the track can be fitted in both carpeted and non-carpeted areas with advantages for the manufacture and installation of the track 7,8.

As shown. the track 7,8 is of rectangular section and is symmetrical about a plane through the insert 9 parallel to the length of the casing 10. In this way, the track 7,8 can be installed either way up to present either one of the sides 11,12 of the insert 9 uppermost for emitting visible light photoluminescently to indicate an escape route in an emergency.

As a result, if the outer surface 13,14 of the uppermost side of the casing 10 is scratched, scuffed or otherwise damaged in service so as to detract from the appearance of the track 7,8 and/or to reduce the visible light emitted photoluminescently by the insert 9, the track 7,8 can be removed, inverted and re-fitted to position the outer surface 13.14 of the lowermost side of the casing 10 uppermost and attach the track 7,8 by the damaged surface which becomes the lowermost surface. This enables a simple and effective repair of a damaged track 7,8 to be effected in situ without requiring a spare part.

As will be understood, such repair may be effected during the normal turnaround of the aircraft between flights so that the aircraft is not grounded or delayed while repairs are carried out. Typically, the track 7,8 is secured with double sided adhesive tape which can be easily removed and the surface of the casing 10 cleaned to remove any traces of adhesive without damage to the surface when the track 7,8 is reversed.

Furthermore, the track 7,8 normally consists of a series of track sections of pre-determined length, for example 1 or 2 metre lengths, butted end to end. As a result, individual sections can be reversed independently and the whole track 7,8 does not have to be reversed when any part is damaged in service. This further simplifies and reduces the time to carry out any repair to the track 7,8.

Referring now to Figure 3, there is shown another construction of track 7,8 according to the present invention in which the insert 9 is housed in an outer casing 10 of light transmissive material. Like reference numerals are used to indicate parts of the track 7,8 similar to the previous embodiment.

In this embodiment, however, the insert 9 comprises a strip of aluminium coated on one side 11 only with photoluminescent material such as strontium aluminate. The casing 10 is a substantially rectangular moulding with a longitudinal slot 15 and the insert 9 is a push fit in the slot 15 from one end. For this, the aluminium strip is thicker than the foil of the previous embodiment. The insert 9 is sealed in the slot 15 to prevent ingress of dirt or moisture by securing aluminium foil to the ends of the casing 10 and the insert 9 can be removed from the slot 15 by rupturing the foil.

In this embodiment, the casing 10 is symmetrical about a plane through the insert 9 parallel to the length of the casing 10 so that the casing 10 can be fitted to present either one of its outer surfaces 13,14 uppermost. In use, the track 7,8 is installed with the insert 9 positioned so that the side coated with the photoluminescent material is uppermost.

In use, if the uppermost outer surface 13,14 of the casing 10 is damaged, the track 7.8 can be detached, the insert 9 removed from the casing 10, re-inserted the other way up and re-sealed. The track 7,8 can then be re-fitted with the casing 10 the other way up so that the undamaged outer surface 13,14 of the casing 10 is uppermost and the side of the insert 9 with the photoluminescent material is also uppermost.

As will now be appreciated, the present invention provides an emergency lighting system in which the track 7,8 can be re-used to effect a repair by simply removing a damaged section of the track 7,8 and re-fitting the section the other way up. In this way, the undamaged underside of the track 7,8 becomes the topside and the damaged topside becomes the underside and is concealed when the section of the track 7,8 is re-fitted.

A repair can therefore be effected simply and quickly without having to replace the damaged section with a new section of track 7,8. This is particularly useful if a new section of track 7,8 is not readily to hand. Furthermore, the cost of setting up and maintaining an extensive network of worldwide supply stores to ensure availability of spare parts if a repair has to be carried out anywhere in the world can be avoided or reduced by re-using the track 7,8 in this way to effect a repair.

It will also be understood that the invention is not limited to the embodiments above-described and that various modifications can be made without departing from the concept of the invention. For example, the track 7,8 can be of any size or shape which allows the track 7,8 to be fitted either way up to emit light photoluminescently in an emergency. The insert 9 and casing 10 may also be made of any suitable materials for the intended application. The casing 10 may be formed in one piece by moulding or extrusion. Alternatively, the casing 10 may be formed in two parts which can be permanently or releasably secured together with the insert 9 therebetween.

The track 7,8 may incorporate markings or symbols to indicate the escape route. For example, arrows or the like may be employed to indicate the direction of the nearest emergency exit and/or the word "exit" may be used to identify the proximity of the exit and reinforce the visual message

provided by the arrows. Such symbols or markings may be provided by masking parts of the photoluminescent material which provides an illuminated background for the symbol or marking. Alternatively, the symbol or marking may be provided by the emission of light of a contrasting colour. For example, the use of dyes or filters to modify/alter the colour of the light emitted by the photoluminescent material. In this way, the provision of the symbols or markings does not significantly reduce the light output from the photoluminescent material.

The provision a reversible track 7,8 according to the present invention may be combined with other features for assisting evacuation of an aircraft. For example, the track 7,8 may form part of a totally integrated system for identifying an escape route to an emergency exit in which the exits themselves and the associated controls for opening the exits are also identified using photoluminescent material. In this way, the use of any separate electrical power source for emergency lighting and exit identification may be entirely eliminated.

The invention has been described in connection with floor mounted tracks 7,8 defining the escape route along an aisle of the aircraft to an emergency exit. It will be understood, however, that the benefits and advantages of the invention may be achieved where the track 7,8 is installed in other positions. For example, the tracks 7,8 may be mounted at an elevated position in an aircraft such as on the aisle seats or the luggage compartments typically provided above the seats to identify an escape route which passengers can follow when the cabin does not fill with smoke. For example, the emergency lighting may be required to assist evacuation of the aircraft if the normal lighting system fails for any reason in a non-emergency situation.

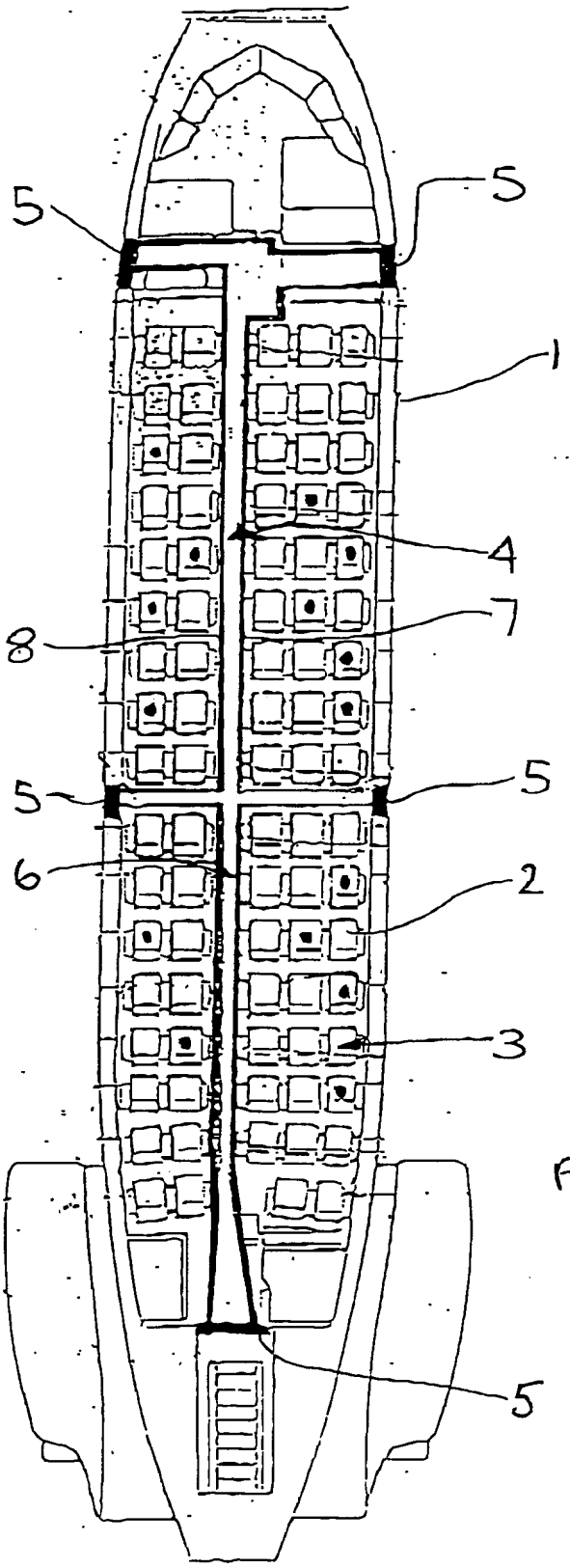

FIGURE 1

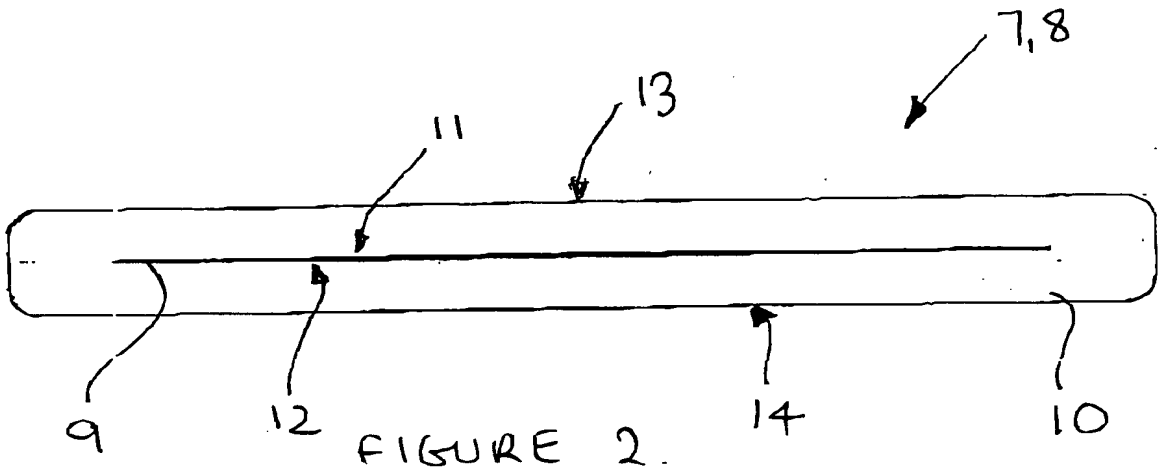

FIGURE 2.

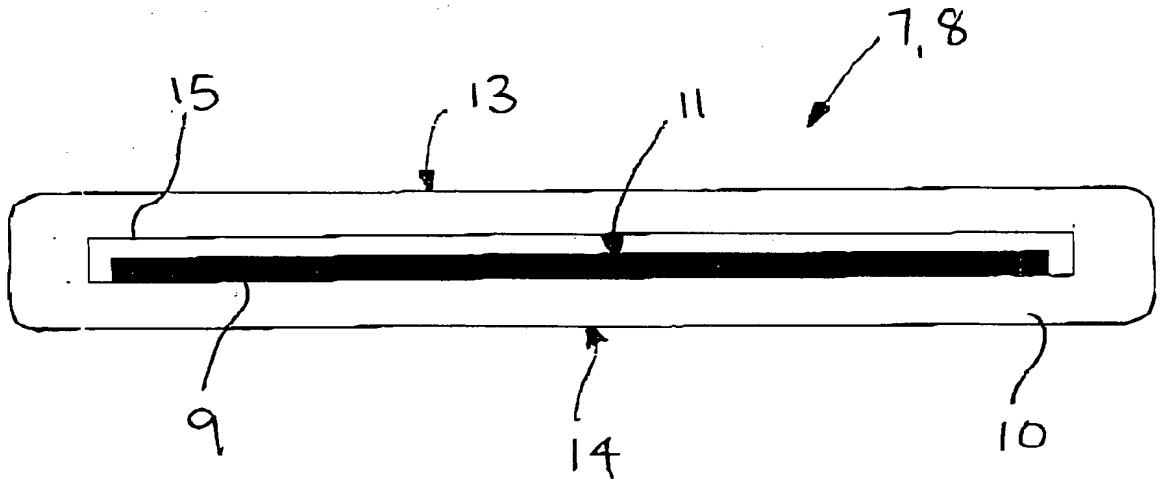

FIGURE 3